

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

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PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year) **26 NOVEMBER 2004 (26.11.2004)**

Applicant's or agent's file reference
PH-20249-PCT

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/KR2004/002104

International filing date (day/month/year)

20 AUGUST 2004 (20.08.2004)

Priority date(day/month/year)

21 AUGUST 2003 (21.08.2003)

International Patent Classification (IPC) or both national classification and IPC

IPC7 C08G 65/32, H01L 21/31, H01L 23/58

Applicant

POSTECH FOUNDATION et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/KR



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**WRITING OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/KR2004/002104

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- ☐ a sequence listing
☐ table(s) related to the sequence listing

b. format of material

- ☐ in written format
☐ in computer readable form

c. time of filing/furnishing

- ☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

**WRITTEN OPINION OF THE
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Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	4-14, 16	YES
	Claims	1-3, 15, 17-18	NO
Inventive step (IS)	Claims	8-9, 12-13	YES
	Claims	4-7, 10-11, 14, 16	NO
Industrial applicability (IA)	Claims	1-18	YES
	Claims	None	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2001/0055891 A1

D2: US 6,107,357 A

I. Novelty

The present invention relates to a porous organosilicate polymer composite prepared by heating an organic/ inorganic hybrid polymer in which an organosilicate polymer is chemically bonded to a radial pore-forming polymer ended with a hydrolyzable alkoxysilyl group and used as a core molecule, and a semiconductor device using an organosilicate polymer composite film.

D1 relates to low dielectric materials essential for a semiconductor having high density and high performance of next generation, particularly to a process for preparing a porous interlayer insulating film having low dielectric constant containing pores with a size of a few nanometers or less.

D2 relates to a novel dielectric composition provided that is useful in the manufacture of electronic devices such as integrated circuit devices and integrated circuit packaging devices.

In the independent claim 1, a porous organosilicate polymer composite prepared by heating an organosilicate polymer and a pore-forming polymer is the same as that disclosed D1 and D2.

Claims 2-3 dependent on claim 1 are the same as D1 in the porous organic polymer composite of claim 1, wherein heating is carried out at 200 to 500°C and organosilicate polymer is chemically bonded to the pore-forming polymer by hydrolysis, dehydrolysis, and polycondensation.

Claim 15 dependent on claim 1 disclosing the organic/inorganic hybrid polymer having a weight average molecular weight of 3,000 to 100,000 g/mol is the same as D1 disclosing polymer within range of from 500 to 1,000,000 g/mol as a weight average molecular weight.

Claims 17-18 are the same as D1 in the semiconductor device using an organosilicate polymer film comprising the porous organosilicate polymer of one of claims 1-3.

(Continued to Supplemental Box.)

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of :

Box V

II. Inventive step

Claims 4-7 dependent on claim 1 are the same as D1 in the pore-forming polymer comprising a branch portion having hydrolyzable alkoxysilyl group at an end and a central portion formed by aliphatic or aromatic ether. The subject matter of claims 4-7 dependent on claim 1 differs from that of D1 mainly in that the branch portion of the pore-forming polymer is prepared by ring-opening polymerization. However, preparing the pore-forming polymer by ring-opening polymerization is already disclosed in D2. Accordingly, a skilled person in the art could have readily obtained the above claims of the present invention by combining the teachings of D1 and D2, and no particular technical difficulty is found in combining the teachings of D1 and D2.

In the claims 10-11 dependent on claim 1, organosilicate polymer obtained by monoalkyldialkoxysilane or monoalkyltrialkoxysilane is the same as that disclosed in D1. The subject matter of claims 10-11 dependent on claim 1 differs from that of D1 mainly in that organosilicate polymer is selected from the group consisting of methyl silsesquioxene, ethyl silsesquioxene, and hydrogen silsesquioxene. However, selecting from silsesquioxene, ethyl silsesquioxene, and hydrogen silsesquioxene is already disclosed in D2. Accordingly, a skilled person in the art could have readily obtained the above claims of the present invention by combining the teachings of D1 and D2, and no particular technical difficulty is found in combining the teachings of D1 and D2.

Claims 14 and 16 dependent on claim 1 differ from D1 mainly in that the pore-forming polymer has a weight average molecular weight of 500-20,000 g/mol, 1-50 wt% and organosilicate polymer has a weight average molecular weight of 3,000-20,000 g/mol, 50-99 wt%. However, such a numerical definition can be arbitrarily modified by a person skilled in the art and the effect thereof is not considered remarkable.

III. Concerning claims 8-9, 12-13

The subject matter of claims 8-9 and 12-13 differs from D1 mainly in that the porous organosilicate polymer composite containing pore-forming polymer represented by Formula 4, Formula 5, Formula 2 and Formula 3. It is cannot be considered obvious to a person skilled in the art, with knowledge of the cited documents, to use pore-forming polymer represented by Formula 4, Formula 5, Formula 2 and Formula 3.

Therefore, claims 8-9 and 12-13 of the prevent invention are considered to meet the requirements of Article 33(2) and 33(3).

IV. Industrial Applicability

The subject matter of claims 1-18 is considered to be industrially applicable under PCT Article 33(4).